

Breast Augmentation Techniques ^[1]

By: Zheng, Margaret Keywords: [transumbilical incision](#) ^[2] [transaxillary incision](#) ^[3] [periareolar incision](#) ^[4] [breast enhancement](#) ^[5]

Breast augmentation involves the use of implants or fat tissue to increase patient breast size. As of 2019, breast augmentation is the most popular surgical cosmetic procedure in the United States, with annual patient numbers increasing by 41 percent since the year 2000. Since the first documented breast augmentation by surgeon Vincenz Czerny in 1895, and later the invention of the silicone breast implant in 1963, surgeons have developed the procedure into its own specialized field of surgery, creating various operating techniques for different results. By having varied incisions, implant placements, and improved ways of treating surgery-related complications, advanced technology has enabled women to undergo breast augmentations for aesthetic, medical, or reconstructive reasons. Trans women may also benefit from breast augmentations. Having the option of a breast augmentation gives women more control over their physical appearance, which may improve their self-image and boost their confidence.

In the nineteenth century, surgeon Czerny performed one of the first breast augmentations in Germany, though surgical breast augmentations did not become popular until the twentieth century. Prior to the development of surgical breast augmentation options, women would inject their breasts with materials such as milk, paraffin wax, or silicone. Those substances would lead to health problems, including tissue death and decay. Additionally, doctors would insert foreign objects into the breast tissue, including glass balls, ivory, ground rubber, ox cartilage, sponges, and tapes. However, it was not until physicians Frank Judson Gerow and Thomas Dillon Cronin created the silicone breast implant in 1963 that surgical options became safe for women.

Women undergo breast augmentation for different reasons, including the desire to improve the shape of breasts, to revise breast asymmetry, to correct for tissue underdevelopment, and to reconstruct deformed or surgically removed breasts. For the latter, surgeons sometimes remove women's breasts to treat or prevent breast cancer. Breast augmentation can also improve a patient's self-image and body confidence. Depending on the patient's anatomy and desired appearance, surgeons choose from four main methods of surgical incisions for breast augmentation. An inframammary incision is an incision made under the breast tissue. A periareolar incision is made around the woman's areola. A transaxillary incision is made through the armpit or side of the woman's body. The last incision is a transumbilical incision, which is made through the naval. Surgeons also must decide whether to place the implant on top of the woman's pectoral muscle, known as a subglandular placement, or behind the woman's pectoral muscle, known as a subpectoral placement. Women can choose a different surgical option, known as a dual plane breast augmentation, which combines incisions made into both the subglandular and subpectoral spaces.

The general procedure for breast augmentation involves two major steps. The surgeon will initially meet with the patient, assess her anatomy, and then discuss with her possible methods of augmentation to achieve her desired result. Once the surgeon and patient come to an agreement, they then choose a date for the operation. On the day of the surgery, the surgeon draws pre-operative lines on the patient's body to serve as a guide for incision locations. Then, once the patient goes under general anesthesia in the operating room, the surgical team can begin the operation. Breast augmentation surgeries usually take one to three hours, and patients can recover at home after the operation. Depending on the type of implant, surgeons instruct patients to avoid strenuous physical activity for about three to six weeks and wear compression bras to help the implants settle. Patients are usually able to resume normal activities after six weeks, but swelling may continue for up to eight.

For those types of procedures, surgeons most commonly used the inframammary breast augmentation technique, which is one of the oldest incision types. The first documented case of a physician using an inframammary incision dated back to around 3000 B.C. in Egypt. Although people did not perform breast augmentations then, ancient Egyptians would use the same incision method to remove breast tumors. In the eighteenth and nineteenth centuries, Jean Louis Petit, director of the French Surgical Academy in Paris, France, also used the inframammary incision to remove cancerous breast tissue and surrounding lymph nodes, which is a tissue vital to the immune system where cancer often spreads. When Czerny performed the first breast augmentation in 1895, he also used that incision, setting a precedent for future operations.

When performing a breast augmentation, surgeons make the inframammary incision in the crease underneath the woman's breast, where it meets the chest. The incision length is about two to five centimeters. The incision site becomes an access point through which surgeons can place larger implants. With the inframammary incision, surgeons also operate near the breast itself, allowing for accurate positioning and control of the implant, while other incisions are further away from the breast, decreasing surgeons' accuracy. The inframammary incision leaves a thin scar at the crease of the woman's breast that can be hidden by a bra line, bikini line, or even the breast itself. However, when using that incision and significantly increasing breast size, surgeons must create a new breast crease to suit the larger implant and center the woman's nipple on the new breast, which adds more time and cost to the procedure. In addition, the inframammary incision is not suitable for patients who later may decide to go further up in breast size because surgeons cannot reuse the same incision scar and must make a new incision elsewhere on the woman's body.

Frederick Jones and Arvydas Tauras created the periareolar breast augmentation technique in 1973. The men were surgeons in the United States Air Force who sought to create an incision that would leave a less visible scar than the inframammary incision. The periareolar technique involves making an incision just within the borders of a woman's areola, which is the section in the center of the breast surrounding the nipple that is more colored than the rest of the breast. After making the incision, surgeons create a surgical pocket, and insert and position the implant, either in the breast tissue itself or behind the woman's pectoral muscle. Because the incision is on the border of the areola, surgeons can camouflage the woman's scar among the areola's texture and color. As with the last incision, surgeons also operate close to the breasts, which gives them greater control over implant placement and bleeding management. In addition, surgeons can reuse the periareolar incision for future breast augmentations, with no need to create a new scar, which is something surgeons cannot do with the inframammary incision. However, in some cases, the woman's scar does not heal properly, and may end up slightly raised or even lighter in color than the areola, making it more obvious. The periareolar technique is also more likely than any other incision technique to cause difficulties for breastfeeding. The woman may lose sensation in her nipple or her entire breast, because surgeons must enter through the breast tissue to place the implant, increasing the risk of damage to the nerves and milk ducts.

The same year that Jones and Tauras created the periareolar technique, in Germany, surgeon Herbert Hoehler created the transaxillary technique in 1973. In his paper published in the *British Journal of Plastic Surgery*, called "Breast Augmentation: The Axillary Approach," Hoehler reported he performed his new method on 228 women and found that the scar was better hidden than incisions made under the breast or on the areola. In the transaxillary breast augmentation, surgeons create a small incision about two and a half centimeters long in the natural fold of a woman's armpit. Through the incision, surgeons create a channel to the breast, and then they form a pocket behind the breast tissue for the implant to rest. For the transaxillary method, it is easier for physicians to use saline implants since they can be inserted as empty shells and filled up with an external syringe. That differs from silicone implants which are prefilled and require a larger incision. The transaxillary incision is less likely to damage the woman's mammary glands than the inframammary and periareolar incisions, making it more appealing for women planning to breastfeed infants. The transaxillary method also leaves almost no visible scar since the incision is hidden in the patient's armpit. However, there are also nerves which connect to the arms and hands located near the incision site in the armpit, and damaging those nerves could lead to permanent numbness in the woman's upper limbs. The incision site is also far away from the breast location, which reduces the control surgeons have over the breast implant's placement, making it more challenging to obtain breast symmetry. In addition, for any future breast surgery, surgeons will need to create a new scar since the previous transaxillary scar cannot be reused.

The transumbilical breast augmentation, or TUBA is the newest of the breast augmentation methods as of 2019. Physician Gerald Wayne Johnson performed the first TUBA in 1991. With TUBA, surgeons make the incision to access the breast tissue near the woman's naval rather than near her breast. The transumbilical method is less invasive than other incision types, with an average operating time of 43.9 minutes unlike other breast augmentation methods which last from one to three hours depending on patient circumstances. The short operation time also results in the patient being under anesthesia for less time and recovering much faster from the operation than a patient who undergoes inframammary, periareolar, and transaxillary implant surgeries. In a paper published in 1993, Johnson and another surgeon John Christ detailed their findings from collectively performing the TUBA operation on ninety-one women in the journal, *Plastic and Reconstructive Surgery*. The women reported slight chest discomfort and some temporary upper abdomen swelling.

For the TUBA method, surgeons create an incision on the upper inside edge of the woman's naval, and using a small camera tool for internal viewing, move empty implant shells to the breast. From there, surgeons position the shells and fill them with saline. Surgeons can also modify the incision site to be from an existing abdomen scar instead of the belly button. However, the TUBA method is not as frequently used as other incision methods due to limited implant options. TUBA operations only allow for inflatable saline implants without the option of prefilled silicone implants, which some patients prefer due to a more realistic breast feel. In addition, the greater distance from the breast makes symmetry more difficult to achieve and future breast surgeries will need a new incision site.

In addition to the implant method surgeons use, the success of a breast augmentation also depends on implant placement within the woman's chest cavity. Implants are all positioned behind the mammary glands but can be placed either above, below, or partially below the chest muscle, known as the pectoralis major. Subglandular placement refers to an operation where surgeons place the implant above the muscle. Subpectoral placement refers to an operation where surgeons place the implant below the muscle. When deciding which placement is better suited for the patient, surgeons must consider the thickness of the woman's breast tissue and its ability to hide the edges of the implant. If the patient has thin and inelastic breast tissue, implants placed above the muscle will be obvious, and the edges may be visible.

Cronin and Gerow were two of the first surgeons to use the subglandular placement in the United States. Women who receive augmentations using that technique tend to have rounder breast shapes and higher positioning, which can aid those who have slightly drooping breasts. Subglandular placement is also the least complicated method and has the shortest recovery time. Athletic women may also choose subglandular placement because they are able to use their chest muscles without interfering with the implant position. However, in addition to the potential for increased implant visibility, subglandular implants also may interfere with mammograms, which are [x-ray](#) ^[6] scans of breast tissue. That makes it more difficult for doctors to detect breast cancer in patients with subglandular implants.

Placement of the implant below the chest muscle, known as subpectoral placement, was introduced on 14 March 1968, by

United States plastic surgeons, William Charles Dempsey and Wilber Latham, in a report at the Symposium of Military Plastic Surgeons in Washington D.C. Their report, titled "Subpectoral Implants in Augmentation Mammoplasty," argued that inserting the implant behind the pectoralis major muscle, a thick layer of chest tissue, would provide additional padding over breast implants, decreasing implant visibility while increasing stability. During surgery, surgeons cut the muscle at its base, then retract it upwards by two to five centimeters. Surgeons then place the implant underneath the muscle, partially covering the implant from the top. The pectoralis major is shaped like a triangle and only covers the upper and middle sections of the implant in the woman's cleavage region. The implant is then held in place by breast tissue and fat at the bottom. Subpectoral placement has a longer recovery time and patients may experience more discomfort because doctors need to manipulate the muscle during surgery. The implant also takes longer to settle into the breast due to increased swelling. However, the subpectoral method reduces the visibility of breast implants and interferes less with mammogram screenings than the subglandular method. Breasts augmented with the subpectoral method have a more natural sloped shape due to the additional muscle padding, but patients must avoid chest-building activities indefinitely since changes in the muscle may shift the implant.

For women with drooping breasts who are also seeking breast enlargement, doctors can combine the subglandular and subpectoral implant placements into a technique called the dual plane augmentation, a term first coined by United States surgeon John Tebbetts in 2006. As in a subpectoral augmentation, surgeons cut the pectoralis major muscle at the base, the lower attachment near the ribs, lifting the muscle from the woman's chest wall. Surgeons then slip the implant underneath the muscle. Additionally, surgeons cut and detach the muscle away from overlying breast tissue. The purpose of the detachment is to release the muscle from overlying breast tissue so that the implant and muscle can settle into a natural breast shape without being attached to the fixed position of the upper breast, nipple, and skin. The dual plane technique's name refers to the cuts made above and below the muscle. However, there are three minor modification surgeons can use when performing a dual plane breast augmentation.

In his article titled "Dual Plane Breast Augmentation: Optimizing Implant-Soft-Tissue Relationships in a Wide Range of Breast Types," Tebbetts described three types of dual plane operations. Dual Plane 1 is what most surgeons were already doing, often known as just the submuscular method, with a single cut at the base of the chest muscle. In Dual Plane 2, surgeons cut the muscle base and create additional separation of the chest muscle from overlying breast tissue up to the bottom edge of the areola. In Dual Plane 3, surgeons cut the muscle base and separate the chest muscle from breast tissue to the upper edge of the areola. Due to the different levels of tissue separation, in Dual Plane 3, the chest muscle retracts upwards the most, Dual Plane 2 second-most, and Dual Plane 1 the least. The technique releases the muscle, allowing the implant to settle naturally, which is beneficial in creating a fullness in the lower breast.

The varied techniques of breast augmentation allow women in many different situations to undergo the procedure. In 2017 alone, surgeons performed a reported 300,378 breast augmentations in the United States, almost three times the number performed in 1997, and the number of operations each year continues to increase. When selecting incision types, some women are very particular about scar location due to their wardrobe choices, while others hope to undergo further breast procedures in the future without additional scars. Patients with very small breasts or women who have had their breasts removed due to cancer or other medical reasons were previously unable to undergo breast augmentations, but the range of options for incision location, implant placement, and implant type creates opportunities for women who otherwise may not have been able to get breast augmentations.

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Topic

[Technologies](#) ^[37] [Processes](#) ^[38] [Reproduction](#) ^[39] [Ethics](#) ^[40]

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- [1] <https://embryo.asu.edu/pages/breast-augmentation-techniques>
- [2] <https://embryo.asu.edu/keywords/transumbilical-incision>
- [3] <https://embryo.asu.edu/keywords/transaxillary-incision>
- [4] <https://embryo.asu.edu/keywords/periareolar-incision>
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